# DOCUMENTATION REQUIREMENTS
# Well Decommissioning - 351

I. Reference Materials

The following reference materials will be used to plan, design, and complete the sealing of abandoned wells:

a. Section IV, Technical Guide, Standard Well Decommissioning (351).
b. North Dakota Construction and Material Specifications for Conservation Practices.
c. Federal, State, and Local Regulations.

II. Site Investigation/Data Collection

The following is a list of items to be checked in the field:

a. Present well owner and address
b. Reason for abandonment & date of abandonment
c. Type of well
d. Well location (locate on map Form ND-ENG-10)
e. Well installation report if available. Obtain copy.

III. Design Surveys

a. Total well depth
b. Casing diameter
c. Casing depth
d. Depth to water
e. Well type
f. Casing material

IV. Design Plans and Specifications

The design of a practice will be in accordance with Standard 351, Well Decommissioning, Section IV, Technical Guide.

The steps in design are as follows:

1. Retaining a certified water well contractor to seal wells should be considered. These professionals are familiar with current procedures, knowledgeable about wells, and have access to necessary equipment. If a certified water well contractor is not used, NRCS inspection will be required.
2. Complete Form ND-ENG-10. Provide information on construction and condition of well; location; list obstacles that need to be removed before sealing the well and method of sealing to be required.

3. Estimate quantities and cost. Table I provides a quick method to estimate bentonite requirements. To calculate the volume of a well or drill hole to determine quantities, use the following equation.

   $v = 3.14\ r^2h$ = volume in cubic feet
   r = radius of well (in feet)
   h = well depth (in feet)

**Table I**
METHOD FOR DETERMINING THE NUMBER OF 50 LB. BAGS OF CHIPPED BENTONITE TO FILL A WELL
Hole Size and Volume Table

| Hole Dia. Inches | Hole Volume (ft3/foot) | Pounds Chipped Bentonite To Fill 1 Ft | Feet Filled by One Bag Chipped Bentonite | Bags Chipped Bentonite to Fill 100 Ft |
|---|---|---|---|---|
| 4 | 0.087 | 6.3 | 7.9 | 12.6 |
| 4½ | 0.110 | 7.9 | 6.3 | 15.8 |
| 5 | 0.136 | 9.8 | 5.1 | 19.6 |
| 5½ | 0.165 | 11.9 | 4.2 | 23.8 |
| 6 | 0.196 | 14.1 | 3.5 | 28.2 |
| 6½ | 0.230 | 16.6 | 3.0 | 33.2 |
| 7 | 0.267 | 19.2 | 2.6 | 38.4 |
| 7½ | 0.307 | 22.1 | 2.3 | 44.2 |
| 8 | 0.349 | 25.1 | 2.0 | 50.2 |
| 8½ | 0.394 | 28.4 | 1.8 | 56.8 |
| 9 | 0.442 | 31.8 | 1.6 | 63.6 |
| 9½ | 0.492 | 35.4 | 1.4 | 70.8 |
| 10 | 0.545 | 39.2 | 1.3 | 78.4 |
| 11 | 0.660 | 47.5 | 1.1 | 95.0 |
| 12 | 0.785 | 56.5 | 0.89 | 113.0 |
| 15 | 1.227 | 88.3 | 0.57 | 176.6 |
| 18 | 1.767 | 127.2 | 0.39 | 254.4 |
| 20 | 2.182 | 157.1 | 0.32 | 314.2 |
| 24 | 3.141 | 226.1 | 0.22 | 452.2 |
| 36 | 7.068 | 508.9 | 0.10 | 1017.8 |

Some sources of commercial bentonite are:

| | |
|---|---|
| HOLEPLUG | N.L. Baroid, Inc. (3/8" and 3/4" chips) |
| VOLCLAY CHIPS & PURE GOLD CHIPS | American Colloid Co. (Both coarse 1/4" to 3/8") chips and medium chips (3/8" to 3/4") Northwest Pipe Fittings Inc., Mandan, ND (wholesale only) |
| ENVIROPLUG | Wyo-Ben, Inc. (Both coarse chips: 3/8" to 3/4" chips and medium chips: 1/4" to 3/8") |

| | |
|---|---|
| TOWER PLUG | Black Hills Bentonite Co. (3/8" and 3/4" chips) |
| WELL PLUG | Fluidril Mud Systems (3/8" and 3/4" chips) |
| PDSCO PLUG | PdsCo. (Polymer Drilling Systems) (Medium and Coarse Chips) |
| PERMA PLUG | Cathodic Engineering Equipment Co. (Both medium - 3/8" & coarse - 3/4" chips) |
| ECONOPLUG | Economy Mud Products Co. (Both coarse -1/2" to 3/4"; and medium 1/4" to 3/8" chips) (Mfg. by Wyo-Ben, Inc.) |

V. Material and Construction Requirements

The cooperator, contractor, and NRCS cooperator*'s* file will be provided Form ND-ENG-10 and the specifications for sealing the well. Plans can also be shown on appropriately sized grid or plan/profile sheets.

The plans will also contain:

a. Construction Notes - Add notes to clarify or furnish direction for construction.

b. Quantities - Estimates based computations described above.

c. Job Approval. (NRCS employees)

Construction specifications are to be provided with each set of plans. The North Dakota Construction and Material Specification for Conservation Practices shall be used for each item of work and material, as applicable or available. Additional specifications may need to be written to provide full material and installation instructions. A cover sheet and list of specifications is to be provided with the specifications.

VI. Layout and Installation Procedures

Any surveys will be recorded in loose-leaf or bound survey books, as applicable. Survey notes will be kept in the format as shown in Chapter I - Engineering Field Manual and/or Technical Release 62. Electronic survey notes will be documented in a format to allow complete checking by others.

a. Remove pump, piping, and any other material obstructions in the well or drillhole that could prevent complete filling.

b. Fine particles contained in the bentonite chips must be removed. This is done by pouring the bentonite chips from the bag such that they tumble down across a coarse-mesh screen 2 to 3 feet in length. The screen should be formed into a U-shape like a rain gutter. One end of the screen should be placed on the top of the well casing while holding the other end of the screen at an angle. Removal of the dust prevents bridging of the material at the water table.

c. Make sure the well "accepts" the entire number of bags or volume of material calculated to fill it. If it doesn't, bridging has occurred. The point of bridging must be broken so the material will fall to the bottom. A poorly sealed well will have greater potential for ground water contamination than one that is sealed properly. Once a well is filled, it is very difficult to correct subsurface problems caused by inadequate sealing.

VII. Checkout

a. Check all quantities.

b. Contractor certification on installation will be accepted from certified well drillers.

c. Installation by persons other than certified well drillers will require on site inspection by the NRCS employee.

d. NRCS employee with appropriate approval authority will need to sign Form ND-ENG-10, Sealing Abandoned Wells Data Sheet, certifying completion and quantities.